



EINLADUNG

zum Vortrag im Rahmen des Seminars des SFB/TRR 31

Freitag, 4. Dezember 2015, 11.00 Uhr c.t.

im Raum W30 0-33/34 der Universität Oldenburg (NeSSy)
und Raum H28 / R 2.31 des Med. Campus Magdeburg (per Videoübertragung)

"Contextuality from Quantum Mechanics to Psychology"

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Probabilistic contextuality is an abstract mathematical notion with the applicability area ranging from behavioral and social sciences to biology to quantum mechanics. We view it as a foundational concept of probability theory because contextuality is about identity of random variables. Our approach to contextuality (dubbed Contextuality-by-Default) entails three principles: (1) the identity of a random variable is a priori context-dependent, its context being defined by all conditions under which it is recorded; (2) random variables recorded in different contexts are stochastically unrelated, but they are characterized by all possible ways in which they can be coupled (imposed a joint distribution on); (3) a system of random variables is noncontextual if and only if one can find a coupling with the following property: the random variables representing ("measuring") one and the same entity in different contexts are equal to each other with the maximal probability allowed by the difference in their distributions. If such a coupling does not exist, the system is contextual. There are numerous mathematical tests (necessary conditions, and sometimes also sufficient) for determining whether a system is contextual. Certain quantum-mechanical systems are theoretically predicted and experimentally confirmed to be contextual. It seems, however, that all behavioral and social systems that have been studied are noncontextual, a disappointment for those who expected them to be "more interesting." However, a greater predictive power that stems from the constraints imposed by noncontextuality may be more than a fair compensation for this disappointment.

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Literature: Dzhafarov, E.N., & Kujala, J.V. (2014). Contextuality is about identity of random variables. *Physica Scripta* T163, 014009 (available as <http://arxiv.org/pdf/1405.2116v3.pdf>)

Dzhafarov, E.N., & Kujala, J.V., & Larsson, J-Å (2014). Contextuality in three types of quantum-mechanical systems. To appear in *Foundations of Physics* (available as <http://arxiv.org/pdf/1411.2244v7.pdf>).